Conducting FSPro and STFB analyses in Alaska
Rules, Guidelines, Hints and General Information
2010 (pre-green up and initial greenup conditions)

Rules and Guidelines

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Pre-green up Conditions

Calibrations on FSPro analyses that started May 27 resulted in rules and guidelines that appeared to be working on numerous fires across the state and are now the basis for initial analyses. These rules/guidelines appear to be working for the pre-green up conditions we were experiencing at the end of May and early June. An assessment of these rules with changing conditions should be completed. For late season fires see the documents prepared by: Stratton, Kurth, Wilmore, Miller from 2009. Alaska is experiencing drier conditions earlier this year, therefore additional calibrations are likely for fires for late season fires.

Helpful hint -From My Home>System Preferences select Google Maps and Alaska LANDFIRE as defaults

FSPro Rules and Guidelines. Rules are highlighted in red – Start your analyses with these rules and document deviations. It is suggested you start with guidelines and modify as necessary. If you are deviating greatly from guidelines you must document – example: if you choose a 300 hour burn period for the 1st ERC class.

ERC Classes

Start date 1/01, End date 12/31
Years: 1990 – 2010 or at least 10 years of data if 20 is not available

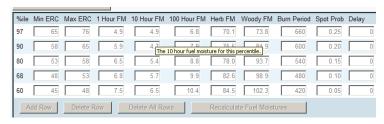**Guidelines for pre-green up conditions**
You will need to change the live fuel moistures, burn period, spot probability. The following are guidelines. Note: generally you will keep the ERC percentile bins that are defaults. However, there may be need to modify these, particularly as the season progresses. These guides were developed to replicate fire spread in fuels pre-greenup as seasonality changes occur these will need to be adjusted accordingly.

% class	Herb FM	Woody FM	Burn Period	Spot Prob
1	30	50	660	.25
2	35	55	600	.2
3	40	60	540	.15
4	45	65	480	.1
5	50	70	420	.05
6 (if added)	55	75	360	.01

Guidelines for pre-green up conditions

The following guidelines are just that guidelines, we had difficulty obtaining accurate information regarding live fuel moistures as we progressed into green-up conditions. The following information was used in the analyses depending on the location of the fire since green-up was occurring at different locations throughout Alaska.

%ile	Min ERC	Max ERC	1 Hour FM	10 Hour FM	100 Hour FM	Herb FM	Woody FM	Burn Period	Spot Prob	Delay
96	61	67	5.2	5.3	7.0	65.6	85.0	600	0.25	0
90	56	61	5.5	5.5	7.9	74.7	91.6	540	0.20	0
79	51	56	6.0	5.9	8.5	78.0	95.9	480	0.15	0
70	48	51	6.4	5.9	9.3	78.5	98.7	420	0.10	0
59	44	48	6.9	6.1	10.1	80.8	101.1	360	0.50	0
0	40	44	7.6	6.1	11.3	85.0	112.0	300	0.01	0

Add Row   Delete Row   Delete All Rows   Recalculate Fuel Moistures

%ile	Min ERC	Max ERC	1 Hour FM	10 Hour FM	100 Hour FM	Herb FM	Woody FM	Burn Period	Spot Prob	Delay
97	65	76	4.9	4.9	6.8	70.1	73.8	660	0.25	0
90	58	65	5.9	4.7	7.9	75.6	84.9	600	0.20	0
80	53	58	6.5	5.4	8.8	78.0	93.7	540	0.15	0
68	48	53	6.8	5.7	9.9	82.6	98.9	480	0.10	0
60	45	48	7.5	6.5	10.4	84.5	102.3	420	0.05	0

The 10 hour fuel moisture for this percentile.

Add Row   Delete Row   Delete All Rows   Recalculate Fuel Moistures

Both of these runs gave results that were acceptable, we didn't see a huge disparity in the probabilities that were predicted.   The following link on the AICC site will take you to the satellite imagery for live shrub moisture, when we compared this information to specific measurements on the ground they were pretty close. So unless you have better information on the ground this may be a starting point.

http://fire.ak.blm.gov/predsvcs/fuelfire.php

ERC Stream

NDFD is not available for forecast.

Spot forecasts and weather station data are available through AICC website.

Winds

Use Both gusts and ten minute average

Guidelines

Six to eight week period around the analysis

Hours – 1000 – 2000 (consider changing to include late night burning….1200 – 2300?)

Landscape

Resolution = 120 M

Alaska LANDFIRE

Landscape Editor

Rules within Past fires - NOTE: the suggested changes listed below for burns 00-09 are strictly guidelines if you have no other intel. on the fuels conditions inside those burns. If you do have any specific

information about old burns in the area of your fire use that information and your calibrations in combination with these guidelines to find out what works. For many of us we don't have specific intel. on old burns in fire areas and/or the fires haven't yet reached the old burns so have nothing to use for calibration, in these cases use the rules below until calibration is possible or you have more intel. on the old fire scars in your fires area.

Changes inside of masks for fire scars from 2000-2009
- Fires from 2000 – 2004 below 200M elevation set FM to 147 for fuel models 147-189 (retaining grass and shrub less than 147 where it existed preburn).
- Fires from 2000 – 2004 above 200M elevation set FM to 142 for fuel models 142-189 (retaining grass and shrub less than 142 where it existed preburn).
- Fires from 2000-2004 set CC to zero (purpose: with CC set to 0 WFDSS will know there is no canopy and you will not need to bother to set CBD or CBH to 0 as well since we changed these areas to shrubs and thus don't want them to have canopy characteristics- however keep in mind the landscape will still display the values for CBD and CBH and not 0, but the model will ignore them for canopy calculations).
- 2005 – 2006 set FM to 161 for models 161-189 (retaining grass and grass/shrub where it existed preburn)
- 2007 – 2009 set FM to 181 for models 161-189 (retaining grass and grass/shrub where it existed preburn)
- For fires 2005-2009 set SH to 5, CBH to .2, CBD to .3, and CC to 35 for fuel models 161-189. (The intent of these edits is that if the thought is that fires from 2005-2009 are burning as fuel models 161 and 181 then we should give them the canopy characteristics necessary for those fuel models to burn as they would if they were 161 and 181).

Rules outside of old burns

- FM 164 = 145
- CBH * .6106
- CBD for timber models (161 – 189) set to 0.3
- Canopy cover – CC between 25 and 45 multiplied by .85
- Canopy cover equal to or greater than 46 multiplied by 0.7

Specific editing rule examples:

The intent of this section was to try create landscape edits within an incident that others could import to new incidents IF they wanted to use the initial rules that were suggested as starting points for new analyses. If you have calibration that worked well for you and you don't follow these edits that is fine. The intent of these rules was to create a starting point for new analysts to see how others had been using them successfully in certain areas of AK at the end of May (pre-green up and early green up conditions). These rule sets will need to be adjusted periodically to account for changes in fuels and weather. However this endeavor was not possible for 2 reasons:
1. For standard global changes the rules could be imported, BUT most of the AK landscapes we are dealing with masks from other fires and all the current AK fires are spread out across a very large area. Importing these rules would actually cause more work because each person has different fires masked into their landscapes and even those same masks that we may have in

common were likely named differently when uploaded. Therefore, importing rules from other fires with other masks would cause more editing work than just creating the rules from scratch for your first run and using the copy function for subsequent runs. Creating a large mask for all fires from 2000-2009, splitting out the 3 categories (00-04, 05-06, & 07-09) is also not feasible because:

    a. WFDSS only lets you upload a shape (in our case a mask) of a certain extent. Similar to how you can only create an LCP extent of a certain size and we would need to upload a very large mask to try to incorporate fire history in multiple fire locations. There is no way to load one large enough to be of any use to more than one of us, except for smaller fires clustered near other smaller fires.

    b. Plus it is useful to have each fire as a separate mask (not lumped in the 3 groups 00-04, 05-06, and 07-09) so you can make specific changes to each fire if needed. This would totally eliminate the usefulness of loading a large mask by category even if we could get it to load.

2. There is some concern out there that with some versions of some browsers landscapes may (or may not be) cached inadvertently, this would mess you up in a hurry with no clue it was even happening....

Given all of this it may still be helpful for any new analysts joining our group to at least see what the initial guideline edits would look like in the Landscape Editor, particularly if they are not used to how the Editor works. The edit rules in the below represent the landscape edits written in red above.

Attribute	Rule Description
Fuel Model	If (Fuel Model is 142, 143, 144, 145, 146, 147, 148, 149, 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) AND (Elevation >=200) AND (LCP intersects fires from 2000-2004) Set Fuel Model to 142
Fuel Model	Else If (Fuel Model is 147, 148, 149, 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) AND (Elevation <199) AND (LCP intersects fires from 2000-2004) Set Fuel Model to 147
Fuel Model	Else If (Fuel Model is 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) AND (LCP intersects fires from 2005-2006) Set Fuel Model to 161
Fuel Model	Else If (Fuel Model is 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) AND (LCP intersects fires from 2007-2009) Set Fuel Model to 181
Fuel Model	Else if (Fuel Model is 164) set Fuel Model to 145
Stand Height	If (Fuel Model is 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) AND (LCP intersects fires from 2005-2009) Set Stand Height to 5.0
Canopy Base Height	If (Fuel Model is 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) and (LCP intersects fire from 2005-2009) Set Canopy Base Height to .2
Canopy Base Height	Else if Multiply Canopy Base Height by .6106
Canopy Bulk Density	If (Fuel Model is 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) and (LCP intersects fire from 2005-2009) set Canopy Bulk Density to .3
Canopy Bulk Density	Else if (Fuel Model is 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) set Canopy Bulk Density to .3
Canopy Cover	If (LCP intersects fires from 2000-2004) Set Canopy Cover to 0
Canopy Cover	Else If (Fuel Model is 161, 162, 163, 164, 165, 181, 183, 184, 185, 186, 187, 188, 189) and (LCP intersects fires from 2005-2009) set canopy cover to 35
Canopy Cover	Else if (Canopy Cover is between 25 and 45) Multiply Canopy Cover by .85
Canopy Cover	Else if (Canopy Cover >= 46) Multiply by .7

Fuel Model Considerations

It appears that three general FM conditions may provide good results in FSPro and STFP for Alaska to match these conditions:

- Little or no crown fire in black spruce – no fuel model changes needed
- Crown fire in black spruce – change FM 164 to 145
- Crown fire in most forest with understory – change FM161 – 165 to 145

Note: These are general rules. Currently the second rule is yielding reasonable calibrations; however, the third rule has been successfully used to mimic extreme conditions.

Check your landscape for holes where fuels aren't mapped. You may need to correct these if they are abundant.

Canopy Rule Adjustment Considerations

Below are some notes on the test of reducing canopy characteristics that Mitch made for the Holanda fire. These are not necessarily recommended just used as examples here to point out finding in this case study. The results could obviously vary greatly depending on the distribution and characteristics of the fuel models.

Mary Taber and Brett Fay's first FSPro runs for the Holanda fire were getting up to a maximum size of one million acres and, seemed to all of us, to be over predicting considerably for current and expected conditions. They modified this by adjusting fuel moistures. Mitch modified it by adjusting canopy cover...a combination of the two would probably be the best approach.

- Instead of applying the CBD rule of .3 to all of the timber models it was dropped to .25 (for all except 161 which was dropped to .20).
- Instead of applying the .611 rule to CBH rule it was the original Alaska Landfire .lcp unchanged.
- For the original .lcp, the CBH across all models was pretty consistent at about .3 meters (which is still very low). Applying the .611 rule dropped this to .1 meters.

This is generalizing (and guessing a bit since burn period was also reduced by an hour) but these two changes seem to reduce the probabilities by 30 -40%. CBH was at around a foot or below so the CBD is making a pretty dramatic impact.

Just a starting point for the future but these rules might represent moderately high to high conditions (as opposed to very high to extreme that we have been using).

Helpful Hints

The following FTP site has helpful information from 2009, as well as information or tools for 2010.

ftp://ftp.nifc.gov/Fire_Planning/AK/WFDSS/Fire_Modeling_Documentation/

In WFDSS go to My Home>System Preferences select Google Maps and Alaska LANDFIRE as defaults make sure AK fires 2000 – 2009 is a selected layer.   Due to the northern latitude, WFDSS Topos are not the best way to view your landscapes and analyses. You will have much greater success with Google Maps.

Internet Explorer Version 6 and 7 Users – If you import landscape rules for an analysis and want to import landscape rules for a different analysis; log off of WFDSS and log back in. There are caching errors that create very ugly results. This may have been repaired and will be checked.

The Alaska Interagency Coordination Center website - http://fire.ak.blm.gov/ has a plethora of valuable data and information, including:

> Current and past fire perimeters
> Fire History
> Modis images
> Weather briefing
> Spot Weather Forecast
> Fire Weather Station Observations
> Seasonal Fire Danger Indices

Obtaining shape files from AICC

A document describing how to download fire perimeters from the AICC IMS site is available at: ftp://ftp.nifc.gov/Fire_Planning/AK/WFDSS/Fire_Modeling_Documentation/Fire_Perimeters/

The document describes how to download Active (current) perimeters, fire progression perimeters and historic perimeters for all of Alaska or for a single fire.

Shape Uploads

- Several people have been dealing with perimeter and shape upload issues. Here's what works....(not necessarily the only thing that works)

- All shapes will be uploaded in analyses, not incidents. (you will get a no permissions error if you try in incidents)

    - You can do this from the upload shape files menu. Here you can upload perimeters, landscape masks, perimeters as ignitions, and ignitions.

- If you want to use a perimeter as an ignition you need to make it an ignition (i.e. you can't upload a fire perimeter as a fire perimeter and then directly use it as an ignition. You can either upload it as an ignition in the upload shape dialogue box or you can select it and save it as an ignition.

- When you upload an ignition (including a perimeter to be used as ignition file) put the date for which that ignition/perimeter is valid in the name.

- When you look at ignition files in the choose ignition file dropdown box, they will likely look like this: 5_27_2010_1600-05/30/10 18:50. The second date and time are a date and time stamp for when you upload the ignition file. You cannot change this time stamp.

- You can also upload shape files from the analysis map.
    - IGNITIONS - On analysis map under incident in the fire perimeters click the triangle to the right of the perimeter you want and make sure this perimeter is on the map. There is a northwest pointing arrow at the top of the screen, select this, then click on the perimeter which will highlight. Then under analysis click the green plus sign next to ignitions. In the name box label your ignition and hit save and it will add this perimeter to the ignitions. The good thing about doing it this way is that you avoid the permanent date stamp you get with the above method.
    - OLD FIRES AS MASKS – On analysis map, Load the historical fire layer data located under "fire related" info (historical fires 2000-2009). Select the 'i' tool at the upper left, then select the historical fire you would like to bring into your analysis. In the info menu select 'feature information'. You will see the name and date of the fire show up. Click the download button (downward pointing arrow). Download the file and then upload it in the shape upload menu as above.
        - You can also upload through the Copy function, this is done through the same exact process except instead of selecting the download button click on the copy button next to the download button. It will take you to a second page where you enter the name of your shape, shape type, and source of the file.

General Information
- ERC Classes
    - Issues:
        - BUI, DMC, and DC are better indicators of fire danger and the fire season than ERC
        - ERCs generally reach their maximums in June and then start to decline fairly fast, faster than DMC and BUI which start to decline in early July and August. Currently the average ERC for the time series declines quickly toward average when fewer months are used. This is during a period when conditions are only becoming warmer and drier and the CFDRS indices are climbing.

    - Resolution:
        - Use 1/01 to 12/31 for your start and end dates, Use 1990 through 2010 for the years.
        - For analyses in mid-June through August add additional ERC bins and make sure that fuel moistures and burn periods reflect actual conditions for the reported ERC values.

Remember you are trying to develop fuel moisture, burn period, and spotting conditions that represent the variation observed in numerous fire seasons. You want to analyze trends and not

the specifics. You are not trying to specify or document the conditions occurring at the nth percentile ERC.